REMARKS

Reconsideration and allowance of this application, as amended, is respectfully requested.

This amendment is in response to the Office Action dated March 13, 2003.

By the present amendment, claims 1-10 have been cancelled, without prejudice to the Applicants' right to file either a divisional or continuation application directed to the subject matter of these claims. New independent claim 11 has been presented to replace the original claim 1, while new dependent claims 12-16 are presented to define further features. New independent claim 17 is presented to define the invention in a means plus function format together with its dependent claims 18-20.

Briefly, the present invention as directed to an improved semiconductor memory element which can more reliably store data than was the case for previous semiconductor memory elements. In particular, from their studies, Applicants' determined that in semiconductor memory devices partial breaks can occur in the silicon oxide gate insulating layer due to voltage stresses created by the repeated rewriting of information. Such leaks in the silicon oxide can lead to a leak of information from the charge storage region of the memory element, thereby seriously degrading the device operation.

Accordingly, in accordance with the elected embodiment of Figs. 1 and 2 of the present invention, a semiconductor memory element is provided which includes a silicon oxide film arrangement including layers such as A7 and A10 with a plurality of silicon microcrystal grains A8 operating as independent and electrically disconnected charge storage regions. (e.g. see column 5, line 26 through page 6, line 20 of the specification). As discussed on page 8, line 2 et seq., these silicon

microcrystal grains operating as indep ndent charge storage regions respectively store charges from individual bits of data (e.g. "1" "0"). If a partial break occurs in the silicon oxide due to extensive information rewriting, the electron leak of charges through the partial break is limited to a leak from individual ones of silicon microcrystal grains. Therefore, the other silicon microcrystal grains A8 will continue to store charges, thereby ensuring the overall reliability of the charge storage operation in the device.

Reconsideration and allowance of newly presented independent claim 11 over the cited reference to Ogura (USP 6388293) is respectfully requested. In the Office Action, reference is made to Fig. 35 of Ogura as teaching a system which anticipates the previously presented claim 1. Although Applicants respectfully disagree with the reading of Ogura on claim 1 (and reserve the right to proceed with claim 1 in a continuation application), in order to clarify the distinctions of the invention over Ogura, new claim 11 particularly defines that the silicon oxide film includes a plurality of silicon microcrystal grains:

> "wherein a perimeter of each of said silicon microcrystal grains is covered with said silicon oxide film so that each of said microcrystal grains constitutes an independent and isolated charge storage region such that said plurality of aid charge storage regions are electrically disconnected.

As such, it is respectfully submitted that new claim 11 clearly defines over Ogura since Ogura fails to teach or suggest any such use of silicon microcrystal grains to constitute independent and isolated charge storage regions which are electrically disconnected from one another.

Quite to the contrary, Fig. 35 of Ogura represents a second embodiment thereof which is us d to store separate data in separate regions. This clear, for example, from the discussion of Fig. 35 starting on column 9, lin 67 through column

10, line 39. These portions describe the use of first and second carrier acc l ration injection portions 112a and 112 for dealing with separate information stored in separate portions above a channel forming semiconductor region 110. Nothing in the Ogura reference, including Fig. 35 thereof, suggests the claimed use of silicon microcrystal grains to constitute independent and isolated charge storage regions which are electrically disconnected from one another. Therefore, reconsideration and allowance of newly presented claim 11 over Ogura is respectfully requested.

Reconsideration and allowance of the dependent claims 12-16 over Ogura is also respectfully requested. Dependent claim 12 further defines the features set forth in independent claim 11 by specifying that an electric potential applied to the gate electrode for writing of data is the same polarity as the electric potential applied for erasing data. Dependent claims 13 and 14 specify the mean size of the silicon microcrystal grain, as discussed, for example, on page 6, lines 4 and 5 of the specification. Claims 15 and 16 specify that the plurality of charge storage regions store charges from the same bit of data, as discussed, for example, beginning on page 8, line 2 of the specification. This is contrary to Ogura's Fig. 35, as discussed above. It is respectfully submitted that the overall combination of features set forth in these dependent claims 12-16, when considered in combination with the features of their parent claim 11, clearly are neither taught nor suggested by the cited reference to Ogura.

New independent claim 17 contains substantially similar limitations to independent claim 11, but defines the invention in terms of means for dispersing charges corresponding to one bit of data into a plurality of independent isolated charge storage regions. As discussed above, Ogura teaches storing separate information in separate regions, rather than the same information disbursed among a

plurality of regions. Therefore, it is respectfully submitted that Ogura fails to t ach or suggest the claimed means for disbursing charges in the memory element, and reconsideration and allowance of newly presented claim 17 is earnestly solicited.

Finally, consideration and allowance of newly submitted claims 18-20 over Ogura is also respectfully requested. New dependent claim 18 defines that the claimed means from parent claim 17 include a plurality of silicon microcrystal grains formed in the silicon oxide film which are electrically disconnected from one another. As discussed above, Ogura fails to teach or suggest any such claimed microcrystal grains. Claim 19 specifies the mean size of such microcrystal grains, which, of course, is in no way suggested by Ogura since this reference fails to teach or suggest such microcrystal grains. Similarly, claim 20 defines the same features as claim 12, and is not all suggested by the cited prior art to Ogura. Therefore, reconsideration and allowance of these newly submitted dependent claims is also respectfully requested.

If the Examiner believes that there are any other points which may be clarified or otherwise disposed of either by telephone discussion or by personal interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

To the extent necessary, Applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in fees due in connection with the filing of

this paper, including extension of time fees, to the Deposit Account No. 01-2135 (Case No. 520.41287X00), and please credit any excess fees to such Deposit Account.

Respectfully submitted,

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